

M. Arnold, B. Simeon

Pantograph and catenary dynamics: a benchmark problem and its numerical solution. - Applied Numerical Mathematics 34:345-362. - 2000.

Abstract. Coupled systems of partial differential equations (PDE's) and differential-algebraic equations (DAE's) are of actual interest in various practical applications. From this point of view we have recently studied the interaction of pantograph and catenary in high speed trains (B. Simeon, M. Arnold: *Coupling DAE's and PDE's for simulating the interaction of pantograph and catenary.* - Mathematical and Computer Modelling of Dynamical Systems 6:129-144. - 2000). To stimulate further research on this topic we formulate in the present paper a simplified model problem that reflects basic parts of the nonlinear dynamics in the technical system pantograph/catenary. Following the method of lines the equations of motion are semi-discretized in space using finite differences. For time discretization, typical DAE techniques are applied such as index reduction, projection steps and handling of systems with varying structure.

Contact: martin.arnold@mathematik.uni-halle.de, simeon@ma.tum.de